Kitsap County WA  PUD 1
Stream Team
Special Thanks to Kathy Dickerson

# MACROINVERTEBRATE MONITORING PACKET

## Sampling Procedures

Macroinvertebrate sampling can be split into five phases: site description, collection, sorting, identification, and interpretation. The site is described based on what type of streamside vegetation and woody debris are present. Aquatic insects are collected using a kick net and a sampling guide made of PVC piping. Once collected, the organisms are sorted by general appearance so that individual organisms can then be identified. Identification is done by using pictures, line drawings, reference collections, and keys. That information is then entered onto a forrn where the nurnbers are used to determine the predominant types of insects present in the sample. These numbers are then used to interpret whether water quality factors might be affecting the insect population.

Complete one full MACROINVERTEBRATE MONITORING PACKET per sample. In order to preserve the streambed, only take one sample at your monitoring site. If you want to do more, work with your teacher to select another nearby site.

Safety comes first! No Stream Team data is worth your safety. Always work with a partner and use common sense. If you do not feel comfortable with the stream condition, please do not proceed with the monitoring. We ask that you not perform the macroinvertebrate monitoring during winter high flows due to safety concerns.

Four things to remember before you sample:

- Always work with a partner
- Study the data sheets and the instructions before going out in the field
- Check the contents of the bug kit to make sure everything is there
- Do the best you can but don't get frustrated. Insect identification takes practice!

## SITE DESCRIPTION

When you first arrive at your site, take some time to fill out DATA SHEET A. The site characteristics box is important because it provides insights when it comes to interpreting the data.

## COLLECTION

1. Standing on the bank of the stream, locate a riffle area. A riffIe is characterized by shallow water two inches to one foot deep, moderately swift moving water, and a rocky stream bottom consisting of gravel from 1/4 inch to 10 inches in size. If you monitor the site on a regular basis you should already know the approximate location of the riffle.

2. Within the riffle, select an area which is typical of the riffle as a whole.

3. At this point don't worry about identifying the insects. Simply separate them by likeness (i.e. similar shapes, sizes, colors, etc.) and put them into the various chambers of the ice cube trays. Be sure to cover the organisms in the tray with water.

4. Once you have sorted all of the organisms in the first scoop, return the water to the creek and transfer another portion of the sample from the bucket to the tray. Once again, separate out like organisms and put them into the ice cube tray. Repeat this process until you have gone through the whole sample. You are now ready to identify and enter the information on the data sheets.


## IDENTIFICATION

1. Once the organisms are in the ice cube trays you can begin to identify them by using the drawings, pictures, reference collection, or keys. At first this seems like an overwhelming task, but the more you do it, the easier and faster it becomes.

2. Go back through each chamber and determine whether or not all of the organisms in that chamber are indeed the same. If you have any question about a particular critter, pull it out and put it in another chamber. Once you have all like organisms in a single chamber, all you have to do is identify one of them.

3. Count the number of each type of organism and enter the number on DATA SHEET

4. Once you have identified all of the organisms in the sample and have entered their number on DATA SHEET B, return all organisms to the stream. If you can not identify some of the insects, just note how many were un-identifiable and make a sketch if possible.

5. Once the numbers of organisms have been compiled, do the necessary calculations on DATA SHEET C to determine the water quality rating and percentage of feeding groups for your stream. This can be done in the field or when you return home.

# MACROINVERTEBRATE COLLECTION USING A KICK NET

Kick nets are semi-quantitative samplers used to collect stream macroinvertebrates in riffles. Riffles are shallow areas with fast moving water. The riffle bottom is composed of gravel and cobble. The greatest diversity of macroinvertebrates is found in riffles. Riffles have high levels of dissolved oxygen and different sizes of rock particles which provide shelter and habitat for stream organisms.

**EQUIPMENT NEEDED:**
- kick net
- white pan
- forceps or tweezers
- sorting pan such as an ice cube tray
- bug keys and bug worksheet

**REMINDER:**

Always work as a team of at least two.

**METHODS:**

1. Find a riffle. Avoid areas that have been disturbed or those with unsafe conditions. Visually select an area in the riffle to sample. It should be around 1 meter square (3 feet by 3 feet). Don't walk in this area.

2. Approach the sample area from downstream. Place the net at the downstream edge of the area. It should be held perpendicular to the flow, but angled slightly downstream. Make sure the bottom edge fits tightly on the bottom. You may need to put a few rocks on the bottom edge of the netto weigh it down and prevent loss of organisms from beneath it. Water should not flow over the top of the net.

3. Stand beside the net, not in the sample area. One person can hold the net, another person can scrub rocks. Pick up the rocks that are a few inches in diameter. Hold them in front of the net and below the water surface as you brush the organisms off. The organisms that were attached will float downstream into the net.

4. Disturb the stream bed in the sample area by kicking it up with your feet. Dance around in riffle in whatever manner strikes you, until you've disturbed the entire sample area.

5. Remove the kick net with a forward scooping motion. You want to avoid losing any organisms out the front and off the surface.

6. Place the net on a ilat light colored area or empty the contents of net into a light colored pan. You can see the organisms more easily if you remove any rocks, algae or debris first. Sometimes with large samples, a portion of the sample or subsample is taken to minimize counting time.

7. Remove the organisms with tweezers or forceps. One person can remove the organisms from the sample and put them into a dish.

## IDENTIFICATION AND ANALYSIS OF AQUATIC INSECTS USING:
## THE KEY TO ORDER AND FEEDING GROUPS,
## TOLERANCE CHART, AND
## WATER QUALITY DIAGNOSIS SHEET

You are ready to identify your "bugs" and diagnose the health of your stream. You'll need your bug key, tolerance chart and water quality diagnosis sheet.

1. Use the bug key provided or one from the references given,to identify the organisms. Sort them into major taxonomic groups (orders) such as stoneflies, mayflies, caddisflies, etc. (Ice cube trays work well for this kind of sorting).

2. After sorting the organisms into a taxonomic groupings, they can next be sorted into "feeding group" with the same bug key.

3. After sorting the organisms, count up the different types and feeding groups. Record the numbers on the bug key sheet. Put your organisms back in the stream.

4. You are ready to diagnose the health of your stream with the tolerance charts provided and numbers you have recorded on your bug key sheet. Use the water quality diagnosis sheet to record the numbers of tolerant and intolerant bugs. You can then calculate a rough water quality index from your data.

# Water Quality Diagnosis With Macroinvertebrates

1. Collect macroinvertebrates with a kick net and sort them using the key provided.

2. In the boxes below, record how many of each organism you have in your sample.

   Here's how:
   - if you find between 1 and 9 of an organism, write a letter "A" next to the name of that organism,
   - if you find between 10 and 99 of an organism, write a letter "B" next to the name of that organism,
   - if you find more than 100 of an organism, write a letter "A" next to the name of that organism.

3. The organisms are placed in the column which indicates their sensitivity to pollution.

Letter codes (A=1-9, B=10-99, C=100 or more)

| Group 1<br>Intolerant | Group 2<br>Somewhat Tolerant | Group 3<br>Tolerant |
|---|---|---|
| caddisfly larva (Trichoptera) | beetle larva (Coleoptera) | blackfly larva (Diptera) |
| hellgrammite (Megaloptera) | fishfly and alderfly larva (Megaloptera) | midge larva (Diptera) |
| mayfly nymph ((Ephemeroptera) | | "left-handed" snail |
| stonefly larva (Plecoptera) | cranefly larva (Diptera) | aquatic worm |
| water penny beetle larva (Coleoptera) | damsel fly/dragonfly larvae (Odonata) | leeches |
| "right-handed" snail | scud (Crustacea) | |
| | sowbug (Crustacea) | |
| | crawfish (Crustacea) | |

| ☐ Total number of letters | ☐ Total number of letters | ☐ Total number of letters |
|---|---|---|
| ___ Index Value<br>(Total number x 3) | ___ Index Value<br>(Total number x 2) | ___ Index Value<br>(Total number x 1) |

Add together the three Index Values to get the Total Index Value:  ☐

Compare Your Total Index Value With the Water Rating Scale Below

| Water Rating Scale |
|---|
| ☐ Excellent (greater than 22) |
| ☐ Good (17-22) |
| ☐ Fair (11-16) |
| ☐ Poor (less than 11) |

| Diversity Rating |
|---|
| ☐ Good: more A's, some B's, few (if any) C's |
| ☐ Fair: few A's, few B's, few C's |
| ☐ Poor: very few A's and B's, few C's |